

What is claimed is:

1. A method for processing a substrate, comprising:
reacting an organosilicon compound with carbon dioxide and one or more oxidizing gases selected from the group consisting of oxygen, ozone, nitrous oxide, carbon monoxide, and water to deposit a dielectric layer comprising silicon, carbon, and oxygen on the substrate; and
depositing a layer comprising silicon and carbon on the dielectric layer.
2. The method of claim 1, wherein the one or more oxidizing gases is oxygen.
3. The method of claim 1, wherein the dielectric layer is deposited using RF power.
4. The method of claim 1, wherein the organosilicon compound is selected from the group consisting of dimethylsilanediol, diphenylsilanediol, dimethyldimethoxysilane, diethyldiethoxysilane, dimethyldiethoxysilane, diethyldimethoxysilane, 1,3-dimethyldisiloxane, 1,1,3,3-tetramethyldisiloxane, hexamethyldisiloxane, 1,3-bis(silanomethylene)disiloxane, bis(1-methyldisiloxanyl)methane, 2,2-bis(1-methyldisiloxanyl)propane, 1,3,5,7-tetramethylcyclotetrasiloxane, octamethylcyclotetrasiloxane, 1,3,5,7,9-pentamethylcyclopentasiloxane, 1,3,5,7-tetrasilano-2,6-dioxy-4,8-dimethylene, 1,3,5-trisilanetetrahydropyran, and 2,5-disilanetetrahydrofuran.
5. The method of claim 1, wherein the organosilicon compound is selected from the group consisting of methylsilane, dimethylsilane, trimethylsilane, tetramethylsilane, dimethylsilanediol, ethylsilane, phenylsilane, diphenylsilane, diphenylsilanediol, methylphenylsilane, disilanomethane, bis(methylsilano)methane, 1,2-disilanoethane, 1,2-bis(methylsilano)ethane, 2,2-disilanopropane, 1,3,5-trisilano-2,4,6-trimethylene, dimethyldimethoxysilane, diethyldiethoxysilane, dimethyldiethoxysilane, diethyldimethoxysilane, 1,3-dimethyldisiloxane, 1,1,3,3-tetramethyldisiloxane, hexamethyldisiloxane, 1,3-bis(silanomethylene)disiloxane,

bis(1-methyldisiloxanyl)methane, 2,2-bis(1-methyldisiloxanyl)propane, 1,3,5,7-tetramethylcyclotetrasiloxane, octamethylcyclotetrasiloxane, 1,3,5,7,9-pentamethylcyclopentasiloxane, 1,3,5,7-tetrasilano-2,6-dioxy-4,8-dimethylene, 1,3,5-trisilanetetrahydropyran, and 2,5-disilanetetrahydrofuran.

6. The method of claim 1, wherein the organosilicon compound is octamethylcyclotetrasiloxane.

7. The method of claim 1, wherein the layer comprising silicon and carbon is deposited in the presence of RF power.

8. The method of claim 1, wherein the layer comprising silicon and carbon is an oxygen doped silicon carbide layer.

9. The method of claim 1; wherein the dielectric layer comprises carbon-silicon bonds and has a dielectric constant less than about 3.

10. A method for processing a substrate, comprising:
reacting an alkylsilane having one methyl group bonded to silicon with carbon dioxide and one or more oxidizing gases selected from the group consisting of oxygen, ozone, nitrous oxide, carbon monoxide, and water to deposit a dielectric layer comprising silicon, carbon, and oxygen on the substrate; and
depositing a layer comprising silicon and carbon on the dielectric layer.

11. The method of claim 10, wherein the alkylsilane is methylsilane or methylphenylsilane.

12. The method of claim 10, wherein the one or more oxidizing gases is oxygen.

13. The method of claim 10, wherein the dielectric layer is deposited using RF power.

14. The method of claim 10, wherein the organosilicon compound is selected from the group consisting of methylsilane, dimethylsilane, trimethylsilane, tetramethylsilane, dimethylsilanediol, ethylsilane, phenylsilane, diphenylsilane, diphenylsilanediol, methylphenylsilane, disilanomethane, bis(methylsilano)methane, 1,2-disilanoethane, 1,2-bis(methylsilano)ethane, 2,2-disilanopropane, 1,3,5-trisilano-2,4,6-trimethylene, dimethyldimethoxysilane, diethyldiethoxysilane, dimethyldiethoxysilane, diethyldimethoxysilane, 1,3-dimethyldisiloxane, 1,1,3,3-tetramethyldisiloxane, hexamethyldisiloxane, 1,3-bis(silanomethylene)disiloxane, bis(1-methyldisiloxanyl)methane, 2,2-bis(1-methyldisiloxanyl)propane, 1,3,5,7-tetramethylcyclotetrasiloxane, octamethylcyclotetrasiloxane, 1,3,5,7,9-pentamethylcyclopentasiloxane, 1,3,5,7-tetrasilano-2,6-dioxy-4,8-dimethylene, 1,3,5-trisilanetetrahydropyran, and 2,5-disilanetetrahydrofuran.

15. The method of claim 10, wherein the layer comprising silicon and carbon is an oxygen doped silicon carbide layer.

16. A method for processing a substrate in a chemical vapor deposition chamber, comprising:

introducing an organosilicon compound into the chamber;

introducing an oxidizing gas comprising carbon dioxide and one or more oxidizing gases selected from the group consisting of oxygen, ozone, nitrous oxide, carbon monoxide, and water into the chamber;

depositing the dielectric layer using a chemical vapor deposition process at a substrate temperature between about 170°C and about 180°C, wherein the dielectric layer comprises silicon, oxygen, and carbon; and

depositing a layer comprising silicon and carbon on the dielectric layer.

17. The method of claim 16, wherein the one or more oxidizing gases is oxygen.

18. The method of claim 16, wherein the dielectric layer is deposited using RF power.

19. The method of claim 16, wherein the organosilicon compound is selected from the group consisting of methylsilane, dimethylsilane, trimethylsilane, tetramethylsilane, dimethylsilanediol, ethylsilane, phenylsilane, diphenylsilane, diphenylsilanediol, methylphenylsilane, disilanomethane, bis(methylsilano)methane, 1,2-disilanoethane, 1,2-bis(methylsilano)ethane, 2,2-disilanopropane, 1,3,5-trisilano-2,4,6-trimethylene, dimethyldimethoxysilane, diethyldiethoxysilane, dimethyldiethoxysilane, diethyldimethoxysilane, 1,3-dimethyldisiloxane, 1,1,3,3-tetramethyldisiloxane, hexamethyldisiloxane, 1,3-bis(silanomethylene)disiloxane, bis(1-methyldisiloxanyl)methane, 2,2-bis(1-methyldisiloxanyl)propane, 1,3,5,7-tetramethylcyclotetrasiloxane, octamethylcyclotetrasiloxane, 1,3,5,7,9-pentamethylcyclopentasiloxane, 1,3,5,7-tetrasilano-2,6-dioxy-4,8-dimethylene, 1,3,5-trisilanetetrahydropyran, and 2,5-disilanetetrahydrofuran.

20. The method of claim 16, wherein the layer comprising silicon and carbon is an oxygen doped silicon carbide layer.